

-PUBLIC NOTICE-
Montana Department of Environmental Quality
announces

JTL Group, Inc. – Lolo Pond Site

SECOND PUBLIC COMMENT PERIOD EXTENDED

The Department of Environmental Quality has again extended the public comment period for the Draft Environmental Assessment written on the above gravel permit application. Pursuant to numerous requests by the public, and as a result of the large display of interest at the Lolo Community Council's emergency meeting on Tuesday evening December 4th, the Department has agreed to grant an extension of two weeks to the comment period. Comments will now be accepted through Friday, December 21, 2007.

JTL Group Inc. of Missoula, Montana has applied for a Mined Land Reclamation Permit to mine and process gravel from a 36.7-acre site located approximately 8 miles south of Missoula on US Highway 93 and approximately 2.4 miles north of the intersection of US Highway 93 and US Highway 12 in Lolo at an approximate elevation of 3,260 feet, mean sea level (MSL) in the SE4 of Section 22, of Township 12 North, Range 20 West, in Missoula County. The site is bounded by US Highway 93 on the east, Bird Lane on the north, and Valley Grove Drive on the south. At full operation the project would include a wash plant, asphalt plant, pug mill, concrete plant, crusher and screening facilities, product stockpiles, and buildings.

The site is presently used for irrigated hay or pasture land with an irrigation supply pond, and contains a house and out buildings that are currently being rented. At final reclamation in the year 2026 the site would be reclaimed as a grassland area with a wildlife pond that the landowner intends to convert into a subdivision and residential pond.

Copies of the application, maps, and other relevant documents as well as additional copies of the environmental assessment are available from the DEQ at the addresses below. The draft EA is also available on the DEQ website at <http://deq.mt.gov/ea/opencut.asp>. DEQ will accept written comments on this proposal until 5:00 P.M. on Friday, December 21, 2007. Please email your comments to rsamdahl@mt.gov. You may also fax or write to one of the addresses listed below.

Department of Environmental Quality
Industrial and Energy Minerals Bureau
109 Cooperative Way, Suite 105
Kalispell, MT 59901
(406) 755-8985 or fax 755-8977

Department of Environmental Quality
Industrial and Energy Minerals Bureau
1520 E. 6th Ave.
Helena, MT 59601
(406) 444-4970 or fax 444-1923

Visit our general website at <http://deq.mt.gov>

DRAFT ENVIRONMENTAL ASSESSMENT
November 2007

Project Name: Lolo Pit

Proponent: JTL Group, Inc.

Type and Purpose of Action: JTL Group Inc. of Missoula, Montana has applied for a Mined Land Reclamation Permit to mine and process gravel from a 36.7-acre site located approximately 8 miles south of Missoula on US Highway 93 and approximately 2.4 miles north of the intersection of US Highway 93 and US Highway 12 in Lolo. The site is bounded by US Highway 93 on the east, Bird Lane on the north, and Valley Grove Drive on the south. At full operation the project would include a wash plant, asphalt plant, pug mill, concrete plant, crusher and screening facilities, product stockpiles, and buildings (see Figures 1 and 2 in Attachment 1).

The site is presently used for irrigated hay or pasture land with an irrigation supply pond, and contains a house and out buildings that are currently being rented. At final reclamation in the year 2026 the site would be reclaimed as a grassland area with a wildlife pond that the landowner intends to convert into a subdivision and residential pond.

Location: Tract 1, COS 5232, Tract 3, CPS 2926, and parcels 2 and 3, COS 5122 located in SE ¼ Section 22, T12N, R20W, MPM

County: Missoula

IMPACTS ON THE PHYSICAL ENVIRONMENT	
RESOURCE	POTENTIAL IMPACTS AND MITIGATION MEASURES
1. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE: Are fragile, compactible or unstable soils present? Are there unusual geologic features? Are there special reclamation considerations?	<p>The Bitterroot Valley occupies an intermountain fault basin between the granitic batholith rocks of the Bitterroot Mountains to the west and the granitic Sapphire Range to the east. The 70 to 90 million year old Cretaceous granitic rocks of the Bitterroot Mountains to the west were sculpted into their present profiles by alpine glaciers. The Bitterroot River Valley fills the bottom of the intermountain, fault block basin at the south end of the Rocky Mountain Trench.</p> <p>The proposed mine is located on a glacial outwash bench that has been re-worked by action of the Bitterroot River. The deposit consists of stratified layers of alluvium and glacial outwash sand, gravel and cobbles that cover the deeper bedrock. The slope/aspect on top is fairly level. The site is bounded by a steep timbered hillside to the west.</p> <p>The soils on the site range from 9 to 36 inches deep and average 15 inches according to the soil test holes dug by JTL (2006b). Inspection by DEQ personnel indicates only 12 inches of soil are exposed in the existing excavated pond located near the center of the site. According to soil survey information, the two main soils on the site range from a very fine sandy loam along the highway to a loam below the hillside, with an area of gravelly loam near Valley Grove Road and a small area of soils that may be wet part of the year along the</p>

IMPACTS ON THE PHYSICAL ENVIRONMENT	
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	<p>northern boundary (NRCS 2007).</p> <p>The soil would be salvaged in advance of mining and stockpiled in berms along the north, south and southwest ends of the operation. The berms would average 8 feet high and 10 feet wide with 3:1 slopes. All berms would be seeded with the reclamation seed mix. The vegetation and the 3:1 side slopes would minimize wind and water erosion on the berms.</p> <p>The landowner has indicated that he would like the berms along the highway to remain after mining has ceased. Under the Agency-Mitigated Alternative, the berms along US Highway 93 to the east would be constructed of subsoil or unsaleable overburden and covered with 15 inches of gravelly loam topsoil. The gravelly loam soil would be less susceptible to wind and water erosion on the berm slopes than the fine sandy loam or loam soils of the majority of the site. If gravelly loam soils are not available, gravel may be mixed with loam soils such that there would be no more than 40 percent coarse fragments in the soil placed on the berms. It is the coarse fragment content that helps to retard soil erosion. Because the berms along the highway would be permanent, some variation in height and form would be warranted under the Agency-Mitigated Alternative to make them more visually appealing rather than presenting a straight engineered appearance. The berm should be a minimum of eight feet high and have minimum slope angles of 3:1. The standard for visual screens is at least six to eight feet above the level of the highway road surface (see Attachment 3). The slope angle and seed mix are important here as well since a berm like this should be mowed to keep weeds and tall grass controlled for aesthetics and fire protection.</p> <p>The topsoil in the temporary berms would be used during reclamation. The banks of the pond and level areas would be reclaimed as mining progresses. A minimum of 15 inches of soil would be replaced over the regraded surface. Soil microbes should re-colonize the soils following replacement.</p> <p>JTL proposes to remove 1,350,000 cubic yards of sand and gravel to a depth of 30 feet from the property over approximately 20 years. Some of this material would leave the site in concrete or asphalt mixes. This would be an irreversible removal of material from this site.</p> <p>JTL has proposed to leave a wildlife pond as part of its reclamation. The pond would follow DEQ pond construction guidelines with several small islands (see Figure 3 in Attachment 1). The shoreline would be irregular. Under the Agency-Mitigated Alternative the shorelines would be 3:1</p>

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	<p>slope down to the low water mark for 75 percent of the shoreline and angle of repose below that. Fifty percent of remaining shoreline would have slopes between 5:1 and 4:1 to the low water mark. Steep drop-off segments that are about 50feet long and drop to a depth of at least 3.5 feet below normal water level along the other 25 percent of shoreline would be interspersed. (Steep drop-offs would keep portions of the shoreline free of emergent vegetation, which would benefit certain wildlife and would provide better recreational access.) A variety of shallow, medium deep and deep water areas within the pond as described in DEQ's pond guidelines for wetland and fish ponds would be created. In various places on at least 50 percent of the shallows bed, 6 inches of fine-textured substrate such as hydric or upland soil would be applied. Areas of sandy, gravelly, and cobbly surfaces would be left. Boulders, rock piles, and tree trunks would be placed in shallows, leaving a portion of each above the normal water level.</p> <p>The islands would be placed in the upwind side of the pond and in other areas protected from the prevailing wind. A 50-foot wide, 2-foot deep separation between islands and the mainland would be maintained and the islands would be kept at least 150 feet apart, both at normal water level. The islands would range from 25-foot diameter circles to 50- by 200-foot rectangles at the seasonal high water level. If able, the long axes of islands would be oriented parallel with the prevailing wind. The shorelines of large islands would be irregular. The islands would be constructed with flat or rounded tops 3 feet above the seasonal high water level. They would be graded to 4:1 slopes that go at least 3.5 feet below normal water level.</p> <p>The shorelines and the islands would be planted with riparian species in the Grass and Grass-Like seed mix in Attachment 2 along with an overseeding of wildflower in the Wildflower seed mix in Attachment 2. Weed-free straw mulch would be used to protect these plantings. Clusters of trees and shrubs should be planted in coves and on points and on the islands to create additional habitat and visual interest. These riparian plants are adapted to wet and moist soils and some will even grow in submerged soils and would help protect and stabilize the shorelines. The plants would also create wildlife habitat.</p> <p>There are no fragile, compactable, or unstable soils present, unusual geologic features, or special reclamation considerations.</p> <p>Cumulative: There is another gravel pit pond directly across Highway 93 from the proposed Lolo Pit site that was operated by American Asphalt at the Earl Pruyne property reclaimed in the early 1990's, and an active sand and gravel pond operation</p>

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	<p>at Bonnie Ford's Blaine pit to the southeast operated by Western Excavating. There are numerous sand and gravel operations in the Bitterroot Valley and several are located within miles of this site in the Lolo area (see Figure 4 in Attachment 1). This proposed operation would add to the cumulative and permanent removal of sand and gravel in the valley as demand for these products grows with the increasing number of subdivisions, new homes, and associated roads as well as new commercial and industrial structures.</p>
<p>2. WATER QUALITY, QUANTITY AND DISTRIBUTION: Are important surface or groundwater resources present? Is there potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality?</p>	<p>This site is about ½ mile from the Bitterroot River. There are no natural surface water features on the site. The road ditch along US Highway 93 carries storm water from the highway and adjacent land during storm events and there is a small man-made irrigation pond in the middle of the property. The water level in the pond fluctuates about 4 feet during the year between seasonal high and low water levels.</p> <p>The static ground water level is approximately 7 feet below the ground surface (bgs) at the south end of the proposed site and 16 feet bgs at the north and west ends of the site. According to a study done for a subdivision that had been proposed at the same site, the ground water flows to the northwest approximately parallel to the Bitterroot River (Land & Water 2002).</p> <p>A total of 22 wells have been identified in Section 22 and five are associated with the proposed project (GWIC 2006). Of the 22, four are USGS monitoring wells adjacent to the Bitterroot River. One well is located at the gravel pit on the east side of US 93. Two wells located south of the proposed operation up-gradient on the gravel terrace supply domestic water to a residence and the Lolo Creek Veterinary Clinic. The remaining wells supply domestic water to houses constructed in the wooded slopes above the gravel terrace. These wells appear to be constructed through bedrock into a water-bearing rock zone rather than into alluvium or glacial till (GWIC 2006).</p> <p>Water for all operations would be obtained on site. Existing water rights allow for the use of 810 gallons per minute (gpm) with 480 and 240 gpm from two existing wells developed in 1946. A 90-foot well, producing 90 gpm, has a priority date of 1981. Water for mining, processing and washing operations would come from the existing excavated pond or the existing wells. The landowner, Ken Allen, would apply to the Department of Natural Resources and Conservation (DNRC) for a 2,000 gpm industrial water right from the pond to be constructed. A recreational water right for the pond would be applied for in the future when required for residential use.</p> <p>Under the Agency-Mitigated Alternative, the post-mining land</p>

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	<p>use would be pasture with a wetland pond that could be adapted for residential use should the landowner apply for a subdivision after the site is reclaimed or during the reclamation process.</p> <p>Aggregate washing facilities could require 1,800 gpm at peak use times. The crusher would use 10 to 15 gpm. Waste water from all aggregate washing and any wet dust collection systems would be discharged to a settling pond as shown in Figure 2 before discharge to the main pond. No liner would be used but the sediment in the waste water would help seal the bottom of the ponds.</p> <p>Dust control is estimated to require about 5,000 gallons per day for 180 days per year or about 3 acre-feet per year. Dust control would include watering roads and dirt surfaces, and spray bars on the crusher and transfer points.</p> <p>Water consumption should not exceed 35 gallons per cubic yard of concrete delivered off site and 15 gallons per ton of sand or gravel. With an estimated annual delivery of 20,000 cubic yards of concrete and removal of 50,000 cubic yards of sand and gravel, water consumption is estimated to be less than 5 acre-feet per year (1,629,257 gallons per year).</p> <p>No fuel would be stored on site. JTL has provided a Groundwater Containment Detection Plan and Spill Contingency Plan for the proposed Lolo Pit site (JTL Inc. 2006). Under the plans, JTL would visually inspect water samples collected from monitoring wells to detect contamination from spill of fuel or hazardous materials used onsite. The plans also describe methods JTL would use to respond to any such spill.</p> <p>Ground water would be monitored on a regular basis in accordance with JTL's proposed Groundwater Sampling and Analysis Plan (JTL, Inc. 2007). Four monitoring wells would be monitored monthly and static water level, temperature, specific conductance and pH would be measured on site. In addition, water quality samples would be collected for laboratory analysis twice in year one, once during the high ground water period and once during the low ground water period. JTL proposed that additional testing frequency would be determined on an ongoing basis by DEQ. Under the Agency-Mitigated Alternative testing would continue semi-annually until DEQ determines the testing frequency should be reduced. Semi-annual reports submitted to DEQ would include a cumulative table of field monitoring data and laboratory results in a format acceptable to the Department, as well as the laboratory analytical reports.</p>

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	<p>In accordance with JTL's proposed sampling plan, semi-annual ground water samples would be submitted for laboratory analysis of regulated VOCs (volatile organic compounds), initial screening of hydrocarbon contaminants, major cations and anions, and common metals as well as total dissolved solids, chloride, and nitrate.</p> <p>A Hydrologic Investigation of the site was prepared by Land & Water (2002) that showed background concentrations of nitrates in the ground water in a lab report from Energy Labs in Billings. Laboratory analysis of samples taken from the irrigation well shows nitrate concentrations of 0.35 milligrams per liter (mg/l), which is below the human health standard of 10 mg/l established in "Circular DEQ-7 Montana Numeric Water Quality Standards". Common human sources of nitrates include septic discharge, dairy and feed lot waste and agricultural fertilizer. Natural nitrates can leach into the groundwater from soils, particularly when agricultural activities such as plowing and disking are practiced in the area. Ground water samples will be analyzed for nitrates to detect any increases in nitrate levels.</p> <p>There are residential wells downgradient from the proposed Lolo Pit, but there are sufficient plans in place to maintain ground water quality to protect the use of those wells.</p> <p>Cumulative: The Bitterroot Valley continues to grow as new subdivisions and commercial structures are proposed and built. The new residences and structures would place increasing pressure on area ground water aquifers to provide potable water. Some new gravel pits are being proposed and existing gravel operations are proposing expansions to provide the gravel, cement and asphalt needed for construction of these new developments and roads. The increase in sand and gravel operations places demands on ground water and increases the possibility of impacting the quality and quantity of ground and surface waters in this area.</p> <p>Dr. Jack Stanford, a research scientist with the Flathead Lake Biological Station, is concerned about the cumulative effects of gravel pits on the Flathead Valley aquifer (Stanford 2002). He has conducted a study of a similar aquifer near the Yakima River in Washington (Snyder and Stanford 2001). There, he found that there was a deleterious effect on the water temperature and biota in the aquifer surrounding a productive salmonid river system. He thinks gravel pits contributed to increased water temperature and disrupted the flow regimes of the aquifer, thereby reducing stream productivity for native fishes and increasing habitat for introduced (exotic) fish species. It may be that gravel pits that impound water</p>

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	<p>contribute to this effect by allowing ponded ground water to warm up relative to the ground water into which the ponded water flows . If that water then reaches surface waters, it may raise the temperature of the receiving stream or lake. Salmonid species are generally cold-water species and increases in water temperature may reduce fish growth or inhibit spawning and incubation if the temperature rose substantially during those critical time periods.</p> <p>There are a number of gravel pits in the Bitterroot Valley located in close proximity to the Bitterroot River that impound water and have left or will leave a lake behind once operations cease. However, given the large volume of water in the river relative to the amount of water in the gravel pit ponds in the immediate vicinity, it is not very likely that this would become a significant issue or impact. Additionally, the ground water in the vicinity of the proposed Lolo Pit flows parallel to the Bitterroot River and ground water exiting the pit would therefore pass through thousands of feet of gravel before having the opportunity to enter surface water flow in the river. Flow through the gravel would provide copious opportunity for any excess heat accumulated in the water to dissipate prior to reaching the river. Periodic monitoring of groundwater temperatures near the proposed JTL pit will provide information on whether any warming of ground water results from the presence of the operation.</p>
3. AIR QUALITY: Will pollutants or particulate be produced? Is the project influenced by air quality regulations or zones (Class I airshed)?	<p>No designated Class I airshed exists in the site area.</p> <p>Fugitive dust would blow off the pit floor, stockpiles, and gravel road within the permit and would be regulated by the Air Resources Management Bureau (ARMB). It is considered to be a nuisance but not considered to be harmful to health. It is regulated at mine sites by gauging opacity - measuring visibility through the dust plume.</p> <p>A water truck would be available for dust control on-site. It is anticipated that an average of 5,000 gal/day of water would be used to control fugitive dust. Other surfactants such as magnesium chloride treatment may also be used in heavy traffic areas or on the access road. Magnesium chloride is an approved, very widely used dust control agent.</p> <p>Air quality permits would be required on the processing equipment before installment. Machinery, such as generators, crushers and asphalt plants, are individually permitted for allowable emissions. Best Available Control Technology (BACT) is the usual standard applied to keep each facility in compliance with its individual permit. The crusher would be equipped with water spray bars that would use about 10 to 15 gal/min, while the asphalt plant would be equipped with bag</p>

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	<p>houses or other pollution control equipment. All air quality laws, rules and regulations would have to be followed.</p> <p>Hot mix (asphalt) plants are usually operated seasonally between April and October. The steam (water) part of the plume from the asphalt plants is not regulated, because it dissipates rapidly due to the seasonally warm temperatures.</p>
<p>4. VEGETATION COVER, QUANTITY AND QUALITY: Will vegetative communities be permanently altered? Are any rare plants or cover types present?</p>	<p>The proposed site is currently planted in timothy and has been hayed in the past. The site has several major infestations of Canada thistle and spotted knapweed, both noxious weeds. The adjacent hillside is timbered with Ponderosa pine and other trees and shrubs. Adjacent residential and commercial properties have lawns, gardens, and a variety of shade trees.</p> <p>All berms would be seeded to protect them from wind and water erosion. The berms along US Highway 93 would be permanent and would be planted with a final seed mix as well as a variety of trees and shrubs to provide screening for the mining operation and the post-mining residential subdivision. The Agency-Mitigated Alternative's suggested tree and shrub varieties, and planting rates are included in Attachment 3.</p> <p>The lack of riparian or wetland species proposed for planting around the reclaimed pond would reduce the attraction of the pond for wildlife as well as create a sterile looking pond. Under the Agency-Mitigated Alternative JTL and the landowner would be encouraged to incorporate plantings of riparian and wetland species along the shoreline to improve wildlife habitat and the visual appearance of the reclaimed pond. A modified seed mix that could be used around the pond at final reclamation to create wildlife habitat is also included in Attachment 2. Some shrub and tree varieties and planting rates are also included.</p> <p>JTL has a weed control plan that has been approved by the Missoula County Weed Coordinator (JTL 2006 and Otten 2006). The application of the approved herbicide would control weeds, including noxious weeds within the permit boundary. The herbicide Milestone is a strong broadleaf herbicide and should not be used in areas where new trees, shrubs or perennials are to be planted until those plants have become established. Until established, care would have to be taken that drift from spraying does not reach these plants. Then careful direct application to ground could be done beneath the trees and shrubs with care not to spray the plants. Mulching beneath the trees and shrubs with black plastic or landscape fabric, and wood chips, or recycled rubber composite tree circles may be a better means of controlling weeds around the trees on the permanent berms along the highway.</p>

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	<p>The presence of the pond, berms, and a subdivision would dramatically change the type of vegetation growing at the site. The vegetation established from the reclamation seed mix used by JTL would eventually be replaced by roads, houses, lawns, and gardens. The noxious weed communities would be eliminated and with proper herbicide application would be prevented from re-establishing on the reclaimed areas during and after mining.</p>
<p>5. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS: Is there substantial use of the area by important wildlife, birds or fish?</p>	<p>The primary animals seen using the site are deer and an occasional elk. Due to the proximity to the Bitterroot River, the site may also be used occasionally by migratory ducks and geese. The site lies adjacent to habitat suitable for use by black bears.</p> <p>The mining operation would tend to discourage use of the land by deer, elk and waterfowl during operating hours because of the generation of noise and dust, and equipment operation. It is possible that they may make use of the site when the equipment is shut down for the day and the staff has left. The deer may be drawn to drink from the operating pit pond rather than crossing the highway to get to the river. Since black bears are known to visit residences in the area, exterior garbage on site may attract black bears unless it is contained in bear-proof containers.</p> <p>There should be no impact to fish in the Bitterroot River since there is about ½ mile between the river and this site (see also Section 2 above on hydrologic impacts.)</p> <p>This gravel pit would permanently displace wildlife from a majority of the site, but is not expected to have any permanent effect on them, as there is other suitable habitat in the area. Some species that would use the reclaimed area include migratory waterfowl and fish, although fish would have to be placed in the pond after reclamation. However, the plant species selected do not include any riparian or wetland species that could be planted along the shoreline to provide better wildlife habitat. A recommendation that JTL or the landowner plant such species will be included in the Agency-Modified Alternative, and if incorporated would improve the likelihood of developing a visually pleasing wildlife pond.</p>
<p>6. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES: Are any federally listed threatened or endangered species or identified habitat present? Any wetlands? Species of special concern?</p>	<p>No threatened or endangered or rare plant species have been identified in the vicinity of the proposed operation. The only threatened animal known to exist within the vicinity of the proposed operation is the lynx (NRIS 2006). However, the openness of the site and the traffic on the highway would tend to make the site undesirable except for transient passage. Lynx would more likely remain in the wooded areas away from human disturbance. Cutthroat trout are known to reside in the Bitterroot River, but since there is about ½ mile between the river and this site, there is little likelihood of any impacts to the</p>

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	trout from a sand and gravel operation at this location.
7. HISTORICAL AND ARCHAEOLOGICAL SITES: Are any historical, archaeological or paleontological resources present?	The State Historic Preservation Office (SHPO) has no listings of prehistoric or cultural sites for this area. During a field survey by DEQ staff no evidence was found to indicate that any surface or subsurface cultural resources exist on site. If some cultural or historic resource were discovered, the SHPO would be notified and operations would be shifted to another area for a reasonable length of time to allow for assessment of the new find.
8. AESTHETICS: Is the project on a prominent topographic feature? Will it be visible from populated or scenic areas? Will there be excessive noise or light?	<p>The proposed site is highly visible from US Highway 93 as well as from a number of adjacent residences on the same gravel terrace and several residences located on the timbered slopes above the site. Berms would be constructed along US Highway 93 and trees and shrubs would be planted on top to provide additional screening from the highway. Berms would also be constructed along the south end and the north end as well as along a portion of the southwest edge along the timbered slope to help screen the residences. These berms would average 8 feet high and 10 feet wide with 3:1 slopes, but because the berms along the highway would be permanent, some variation in height and form would be allowed under the Agency-Mitigated Alternative to make them more visually appealing rather than present an engineered appearance. These berms need to be at least 6 to 8 feet higher than the adjacent highway road surface.</p> <p>The landowner has indicated he would plant a row of a variety of trees at the far end of his adjoining property to the north to help screen the operation from the existing residences. These trees along with the berms at the north end of the proposed permit area and the distance from the operation would help mitigate visual and sound impacts to those residences. Additionally, the landowner has indicated that he would be building condominiums on that northern piece of property and those buildings would further buffer the existing residences. The berms and trees planted along the northern permit boundary would help to mitigate sounds and visual impacts to the condominiums once they are built.</p> <p>People living in the vicinity of places where heavy equipment is working are particularly annoyed by backup alarms. Heavy equipment with backup alarms would be used during the first stage of mining until the water table was reached. After that point, the dredging equipment would be the primary equipment in use. Sound waves bend around objects. Since vegetation tends to absorb or disperse sound, the vegetative screen along berms would lessen the noise from the project but would not eliminate it. Humid air, which often occurs in the morning, carries sound farther, and a lack of background noise at that time of day seems to make sounds even louder. However, the</p>

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	<p>sound of the traffic along U.S. Highway 93 would help to mask mining equipment sounds to a certain extent. During the summer, residents spend more time outside, and often keep doors and windows open for ventilation. In effect, noise would tend to be more bothersome in the mornings and in the summer.</p> <p>Under the Agency-Modified Alternative the activities and hours of operation for Saturday would be modified to reduce noise impacts. Only loading and hauling operations would be allowed on Saturday, and only between the hours of 8 a.m. and 5 p.m.</p> <p>The suggested planting of riparian and wetland species along the shoreline would make the sterile shoreline of the pond visually more pleasing while providing suitable wildlife habitat. However, JTL and the landowner would have the option whether or not to implement this recommendation.</p>
<p>9. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY: Will the project use resources that are limited in the area? Are there other activities nearby that will affect the project?</p>	<p>The landowner plans to construct condominiums on the adjoining parcels to the north that are zoned residential. The water supply and sanitary pipelines would be installed between the highway and the berms for the Lolo Pit operation. These pipelines would be tapped into to provide water and sewer service to the subdivision to be developed after mining is completed at the proposed Lolo Pit site.</p> <p>There is a sand and gravel operation across the highway and slightly south from the proposed site. This operation is permitted by Bonnie Ford and operated by Western Excavating. This new pit would increase the number of gravel trucks entering and leaving the highway along this stretch of US Highway 93.</p>
<p>10. IMPACTS ON OTHER ENVIRONMENTAL RESOURCES: Are there other studies, plans or projects on this tract?</p>	<p>The main access road provides access to an adjacent landowner who lives in a house in the wooded area behind the site. Before the mine moves through the main access road, JTL would need to provide replacement access to US Highway 93. This access could go either east and connect up with Bird Lane or west along the permit boundary to connect with Valley Grove Drive. A plan needs to be submitted to DEQ prior to removal of the main access road describing the location of the replacement access road that is acceptable to this adjacent landowner.</p> <p>A ground water study was conducted on the existing site and the adjoining property to the south to investigate its potential for a subdivision with wells and individual septic systems (Land & Water 2002). It was determined that ground water was too close to the surface for such development. The northern property is zoned residential and the landowner intends to develop it by building a number of condominiums on it as soon as he can get all necessary approvals and permits. Water would be supplied by the Lolo water district and waste</p>

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	water by the Lolo sanitary system.

IMPACTS ON THE HUMAN POPULATION	
RESOURCE	POTENTIAL IMPACTS AND MITIGATION MEASURES
11. HUMAN HEALTH AND SAFETY: Will this project add to health and safety risks in the area?	There would be an increase of gravel, concrete and asphalt trucks entering and leaving that stretch of US Highway 93 during the operation of the Lolo Pit. The amount of traffic increase would depend on the number of projects requiring products at any given time. Trucks would be using the existing drive approach to the property.
12. INDUSTRIAL, COMMERCIAL AND AGRICULTURAL ACTIVITIES AND PRODUCTION: Will the project add to or alter these activities?	<p>This property is a timothy hay field. Mining would alter the characteristics of this property during operation as the land could not be used for agricultural purposes. The post-mining land use would be a residential subdivision built around a pond. Agricultural use of this land would be permanently lost.</p> <p>A rental house is currently located in the middle of the property. The house would be removed before the operation reached the access road. It is unknown whether any of the houses to be built in the post-mining subdivision would be constructed as rental units.</p> <p>Since there is another gravel pit operating in the vicinity as well in other areas within the valley, this proposed operation would add to sand and gravel operations in the Bitterroot Valley.</p>
13. QUANTITY AND DISTRIBUTION OF EMPLOYMENT: Will the project create, move or eliminate jobs? If so, estimated number.	JTL staff would be utilized from other sites as needed. Two employees would be available on site as dictated by market conditions.
14. LOCAL AND STATE TAX BASE AND TAX REVENUES: Will the project create or eliminate tax revenue?	Additional local and state taxes and revenues would be generated from the sale of sand, gravel, concrete, and asphalt from this proposed mining operation over its proposed 19-year mine life. This would be more revenue than was generated from the sale of hay bales or property taxes on agricultural land. Property tax revenues would increase again when the subdivision was developed and houses were constructed.
15. DEMAND FOR GOVERNMENT SERVICES: Will substantial traffic be added to existing roads? Will other services (fire protection, police, schools, etc) be needed?	<p>No additional government services would be required, although this operation would fall within the Missoula Rural Fire District. JTL has included a Spill Prevention Control and Containment Plan that would minimize hazardous materials cleanup and response by government agencies.</p> <p>There would be an increased need for government services after mining ceased and the subdivision was developed. People would need fire and police protection and children would need access to local schools. There could be enough of an increase in residential traffic from the subdivision that MDT may determine that a light was necessary especially during morning and evening rush hours.</p>
16. LOCALLY ADOPTED	The land being proposed for mining is un-zoned. Zoning compliance

IMPACTS ON THE HUMAN POPULATION	
RESOURCE	POTENTIAL IMPACTS AND MITIGATION MEASURES
ENVIRONMENTAL PLANS AND GOALS: Are there State, County, City, USFS, BLM, Tribal, etc. zoning or management plans in effect?	has been obtained from the Missoula County Planning Department (2006).
17. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES: Are wilderness or recreational areas nearby or accessed through this tract? Is there recreational potential within the tract?	U.S. Highway 93 provides the primary route up the Bitterroot Valley from Missoula south to the Idaho border and parallels one portion of the Lewis and Clark Trail as well as a portion of the Nez Perce Trail. There are numerous access points to National Forest Lands, campgrounds, and other recreational areas off US Highway 93. Other than a slight increase in truck traffic during operation of the pit, there should be no effect on any people using the highway to access these recreational areas. There is no recreational potential within this tract.
18. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING: Will the project add to the population and require additional housing?	The proposed project would not add to the population and require housing for employees. However, the post-mining land use includes a subdivision and pond. This would increase the population of the area according to the number of people moving into the subdivision.
19. SOCIAL STRUCTURES AND MORES: Is some disruption of native or traditional lifestyles or communities possible?	N/A
20. CULTURAL UNIQUENESS AND DIVERSITY: Will the action cause a shift in some unique quality of the area?	There are other sand and gravel pits in the area. These operations change the landscape and may be perceived by some individuals as causing a shift in the unique quality of the area. The construction of the subdivision would create a second shift in the uniqueness of the area and add to the expanding housing areas that are being developed throughout the Bitterroot Valley.
21. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:	N/A

22. Alternatives Considered:

- A. No Action Alternative: Under this alternative the permit for JTL's Lolo Pit would be denied. The land would remain as hay land until other uses of the land were proposed and implemented. JTL and the current landowner would be denied full utilization of this property at this time.
- B. Proposed Action: JTL would start mining at the southern end of the proposed Lolo Pit site with loaders until reaching the ground water table. At that time mining would shift to excavators and continue from south to north until pond construction is complete. Soil and the silty overburden would be removed in advance of gravel removal and placed in berms along the south, north and southwest boundaries of the permit area. Another berm would be constructed along US Highway 93. All berms would be vegetated. The area around the pond and the mined land would be reclaimed concurrently as mining progressed north. The operation would include a crusher, screen, and wash plant as well as a concrete plant, pug mill, and asphalt plant. Hours of operation would be from 7 A.M. to 7 P.M., Monday through Saturday, with additional hours on a limited basis for specific projects such as 24/7 paving during highway construction.
- C. Agency-Modified Alternative: JTL would be required to implement the following mitigations:
 - 1. The berm to be constructed along US Highway 93 would be constructed of subsoil and topsoiled with 15 inches of gravelly loam topsoil. If gravelly loam soils are not available, gravel may be mixed with loam soils such that there would be no more than 40 percent coarse

fragments in the soil placed on the berms. It is the coarse fragment content that helps to retard water erosion. Because the berms along the highway would be permanent, some variation in height and form would be warranted to make them more visually appealing rather than presenting a straight engineered appearance, but the side slopes could not be steeper than 3:1. The berms must be at least 8 feet high and 6 to 8 feet above the adjacent highway.

2. Under the Agency-Mitigated Alternative, the post-mining land use would be pasture with a wetland pond that could be adapted for residential use should the landowner apply for a subdivision after the site is reclaimed or during the reclamation process. Shorelines would be 3:1 slope down to the low water mark for 75 percent of the shoreline and angle of repose below that. Fifty percent of remaining shoreline would have slopes between 5:1 and 4:1 to the low water mark. Steep drop-off segments that are about 50 feet long and drop to a depth of at least 3.5 feet below normal water level along the other 25 percent of shoreline would be interspersed. (Steep drop-offs would keep portions of the shoreline free of emergent vegetation, which would benefit certain wildlife and would provide better recreational access.) A variety of shallow, medium deep and deep water areas within the pond as described in DEQ's pond guidelines for wetland and fish ponds would be created. In various places on at least 50 percent of the shallows bed, 6 inches of fine-textured substrate such as hydric or upland soil would be applied. Areas of sandy, gravelly, and cobbly surfaces would be left. Boulders, rock piles, and tree trunks would be placed in shallows, leaving a portion of each above the normal water level.
3. Riparian and wetland species should be planted along the shoreline to improve wildlife habitat and the visual appearance of the reclaimed pond. A modified seed mix that could be used around the pond at final reclamation to create wildlife habitat is included in Attachment 2. Some shrub and tree varieties and planting rates are also included.
4. The berms along US Highway 93 would be permanent and would be planted with a final seed mix as well as a variety of trees and shrubs to provide screening for the mining operation and the post-mining residential subdivision. The suggested tree and shrub varieties and planting rates are included in Attachment 3.
5. Water quality testing would continue semi-annually until DEQ determines the testing frequency should be reduced.
6. The herbicide Milestone is a strong broadleaf herbicide and should not be used in areas where new trees, shrubs or perennials are to be planted until those plants have become established. Until established, care would have to be taken that drift from spraying does not reach these plants. Then careful direct application to ground might be done beneath the trees and shrubs with care not to spray the plants. Mulching beneath the trees and shrubs with black plastic or landscape fabric, and wood chips, or recycled rubber composite tree circles may be a better means of controlling weeds around the trees on the permanent berms along the highway and would be duly considered.
7. The activities and hours of operation for Saturday would be modified to reduce noise impacts. Only loading and hauling operations would be done on Saturdays between the hours of 8 a.m. and 5 p.m.
8. Before the mine moved through the main access road, JTL would need to provide replacement access to US Highway 93 for the landowner on the hillside above the site who uses this access road. This access could go to either north and connect up with Bird Lane or south along the permit boundary to connect with Valley Grove Drive. A plan needs to be submitted to DEQ prior to removal of the main access road describing the location of the replacement access road that is acceptable to this adjacent landowner.
9. Any exterior garbage cans that may be used for food wastes should be bear-proof to avoid providing a food source to local black bears.

23. Public Involvement, Agencies, Groups or Individuals contacted: Montana State Historic Preservation Office, Montana Department of Transportation, Montana Natural Heritage Program,

Missoula County Weed Coordinator, Missoula County Planning Department. This draft EA will be advertised in the Missoulian newspaper and made available to the public for comments.

- 24. Other Governmental Agencies with Jurisdiction, List of Permits Needed:** Missoula County Weed Coordinator (weed control plan), DEQ Air Quality program for crusher and asphalt plant permits, DNRC for water rights.
- 25. Magnitude and Significance of Potential Impacts:** Impacts are unlikely to be significant because of the proposed operation's location and the lack of population density, critical wildlife or plant species or habitats. The greatest impacts would be from the noise and visual impacts created by the mining operation. To the extent allowed by law, berms would be constructed around the perimeter of the permit area and, under the Agency Modified Alternative, trees and shrubs would be planted along the outside edge of those berms and possibly along the top. These measures would help to reduce the sounds generated by the mining operation from reaching nearby residences but would not eliminate the noise. The berms and vegetation will also help to screen the site from the highway and adjacent properties.
- 26. Regulatory Impact on Private Property:** The analysis conducted in response to the Private Property Assessment Act indicates no impact. The Department does not plan to deny the application nor restrict the use of private property so as to constitute a taking. The mitigations imposed in the Agency Modified Alternative are necessary to comply with the visual and noise mitigation requirements of the Opencut Mining Act.

References Cited:

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- JTL Inc. 2006b. Preliminary Pit Report by Jack A. Brown for JTL. January 28.
- JTL Inc. 2007. Groundwater Containment Detection Plan and Spill Contingency Plan, Lolo Pond Site. [Dated stamped January 16, 2007.] January 11.
- JTL Inc. 2007. Groundwater Sampling and Analysis Plan. January 10.
- Land & Water. 2002. Hydrologic Investigation, Project No. 110361. Included in JTL Group Inc. Groundwater Sampling and Analysis Plan for Lolo Pond Site, January 10, 2006. August 28.
- Missoula County Planning Department. 2006.
- NRCS. 2007. Soils survey information for the Lolo Pit site area found at <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>. May 15.
- Otten, William F. 2006. DEQ Weed Compliance form signed by Missoula County Weed Coordinator and dated 11/27/06. [Date stamped December 06.]

Recommendation for Further Environmental Analysis:

☐ EIS ☐ More Detailed EA ☒ No Further Analysis

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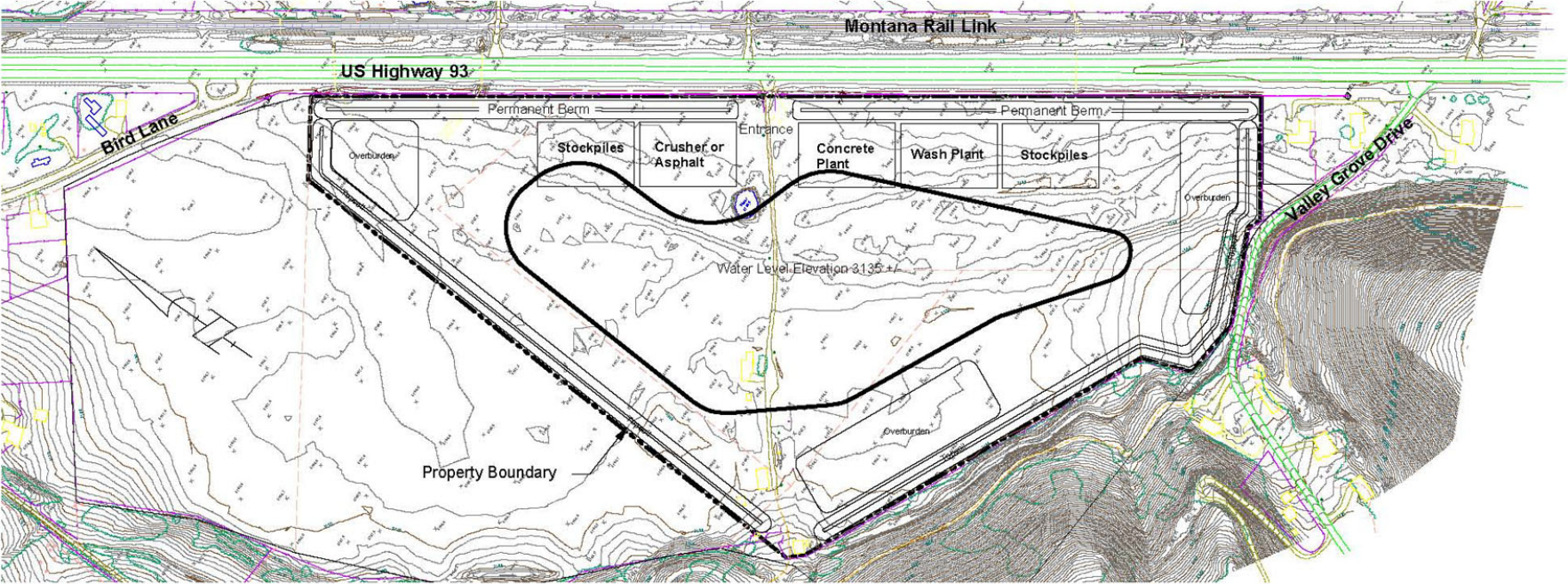
Supervisor, Opencut Mining Program

Title

ATTACHMENT 1

JTL LOLO PIT MAPS

Figure 1 - SITE PLAN MAP



LEGEND

- EDGE OF ASPHALT
- EDGE OF GRAVEL
- CULVERT
- AIRIAL POWER LINE
- BURIED TELEPHONE LINE
- BURIED CABLE TELEVISION
- FENCE
- RAILROAD TRACKS
- CONTOUR (2 FOOT INTERVAL)
- POWER POLE
- TELEPHONE PEDESTAL
- CABLE TELEVISION PEDESTAL
- TEMPORARY BENCH MARK



SE4, Section 22
T12N, R20W
Missoula County
Permit Area = 65 Acres

Facility locations shown are approximate only.
Locations will be adjusted to correspond with
construction of the pond. Facilities shown will
be portable and located on site as needed.

Mining and Facilities Map
Lolo Pond Site

JTL Group, Inc.- Missoula
12/18/2006

Figure 2 – WASH PLANT

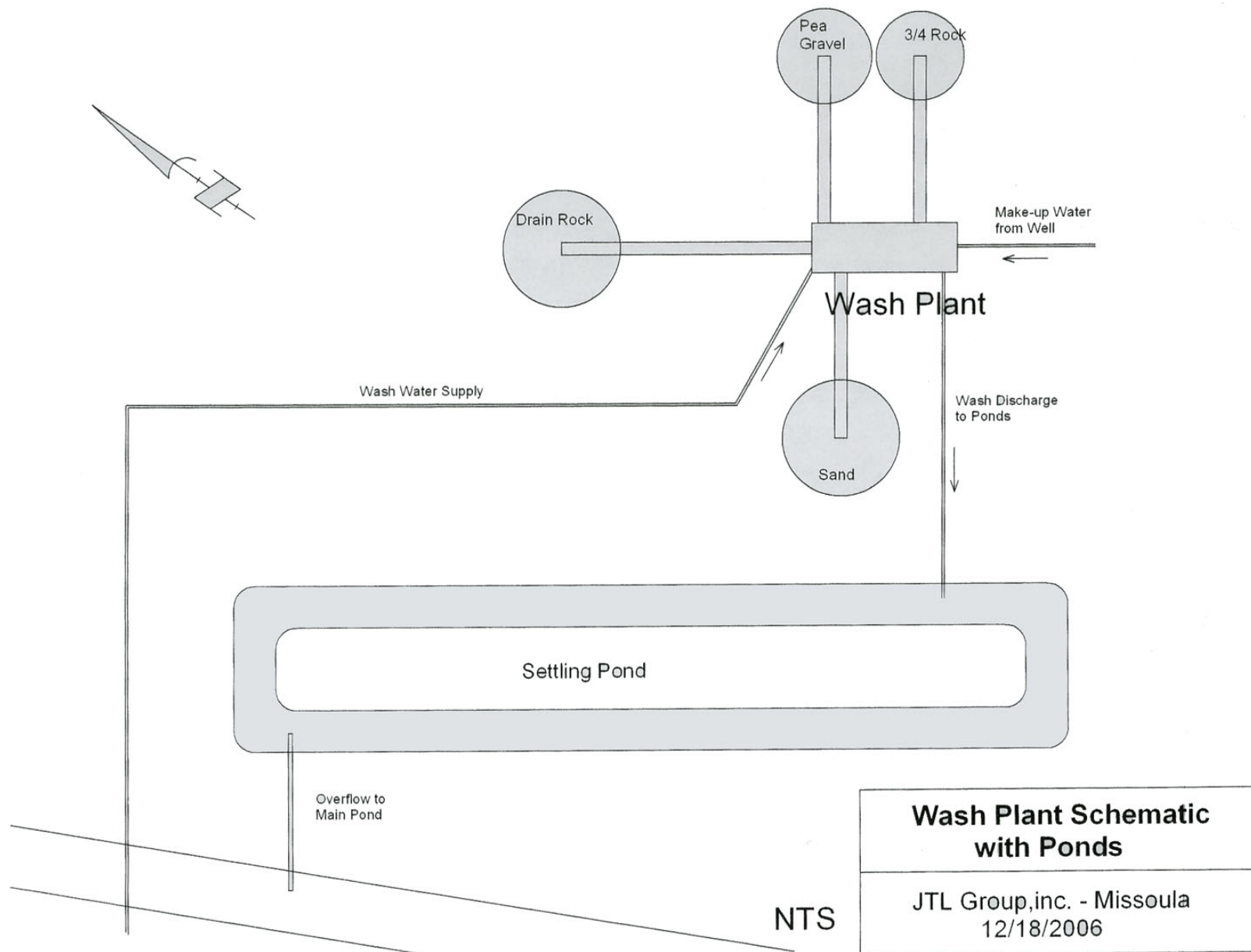


Figure 3 - RECLAIMED SITE MAP

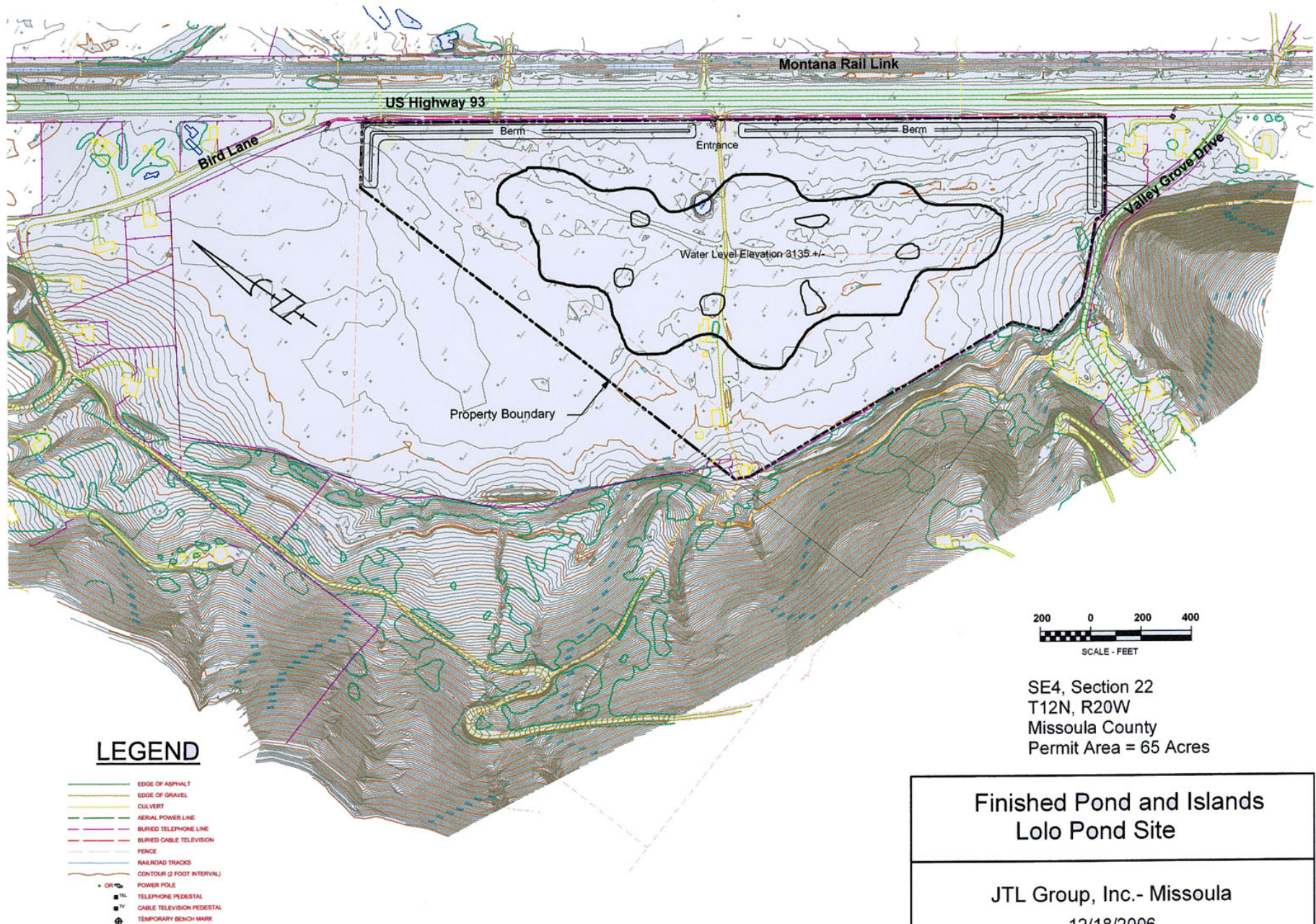


Figure 4 - REGIONAL GRAVEL PIT LOCATIONS



ATTACHMENT 2

AGENCY RECOMMENDED RIPARIAN SEED MIXES

Riparian Planting Plan and Seed Mixes

General Planting Plan

The *Grass and Grass-Like Plants Seed Mix* in the attached table should be used on all islands and within 8-10 feet of the pond. It is applied at a rate of 8 pounds of pure live seed (PLS) per acre or approximately ½ lb. per 10,000 square feet. Since a number of the species will even grow below water, the seeds should be planted down the pond slope below the high water level and raked into the soil and the soil tamped down. A weed-free straw mulch should be placed on top of the plantings to prevent the seed from being washed away and being eaten by birds.

The *Wildflower Seed Mix* in the attached table can be overcast over the grass seed mix or mixed in with it and applied at the same time. This seed mix is applied at a rate of 2-4 pounds PLS per acre or approximately 2 oz. per 1,000 square feet. This seed mix adds a bit of color to the area around the pond and attracts butterflies.

Trees and shrubs should be planted in clusters around bays, on prominent points, and on the islands. Trees should be planted no closer than 12 feet and shrubs no closer than 6-8 feet.

- Because of its tendency to sometimes get weedy, the coyote willow should be limited to the islands
- Box Elder and Alder can grow to be larger trees so plant no more than 4 or 5 total around the pond and plant smaller shrubs around them.
- Make use of shrubs such as chokecherry and serviceberry for their flowers, berries and fall color and the red-osier dogwood for its red stems. These plants will help create additional visual interest at other seasons along with the wildflowers.

Common Name Trees and Shrubs	Scientific Name	Height	Notes
Rocky Mountain maple	<i>Acer glabrum</i>	20-25'	Shrub or small tree, striking fall color
Boxelder	<i>Acer negundo</i>	35-60'	leaves turn red in fall
Thinleaf alder	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	20-30'	can create thickets
Saskatoon serviceberry	<i>Amelanchier alnifolia</i>	15'	white flowers
Red osier dogwood var. Ruby	<i>Cornus sericea</i> ssp. <i>Sericea</i>	6-10'	red bark interesting in winter
Black chokecherry	<i>Prunus virginiana</i> var. <i>melanocarpa</i>	15-25'	white flowers
Golden currant	<i>Ribes aureum</i>	3-4'	Yellow flowers in spring, red or black berries, arching branches; suckers readily
Woods rose	<i>Rosa woodsii</i>	4-6'	Single pink flowers bloom in June, red hips in fall and winter; suckers readily
Babb willow	<i>Salix bebbiana</i> , cultivar Wilson	10-25'	
Narrow leaf/sandbar/coyote willow	<i>Salix exigua</i>	3-20'	can get weedy by suckering a lot
Diamondleaf willow	<i>Salix planifolia</i>	8'	
Dwarf mountain ash	<i>Sorbus scopulina</i>	6-12'	Deep green leaves turn orange-red in fall, clusters of orange berries attract birds

Common Name	Scientific Name	Height	Notes	lbs PLS per acre
Grasses				
Big bluestem	<i>Andropogon gerardii</i>	4-8'	will grow in dry to wet soils	0.40
American slough grass	<i>Beckmannia syzigachne</i>	1.5-3'	will grow in wet soils	1.70
Fringed brome	<i>Bromus ciliatus</i>	1-5'	will grow in wet soils	0.30
Blue joint grass	<i>Calamagrostis canadensis</i>	5'	will grow in water/wet soils; can become weedy	0.08
Tufted hairgrass	<i>Deschampsia cespitosa</i> var. "Nortran"	1-2'	will grow in wet soils	0.32
Canada wild rye	<i>Elymus canadensis</i>	3-5'	will grow in dry to wet soils	1.20
Reed manna grass	<i>Glyceria grandis</i>	3-5'	will grow in water/wet soils	0.24
Fowl manna grass	<i>Glyceria striata</i>	1-3'	will grow in wet soils	0.16
Cord grass	<i>Spartina pectinata</i>	3-5'	will grow in wet soils	0.60
Total Grass Seeds				5.00

Grass-like Plants

Bottlebrush/long-haired sedge	<i>Carex composita</i>	1-2'	will grow in wet soils	0.20
Beaked sedge	<i>Carex rostrata</i>	1-4'	will grow in wet soils	0.50
Broom/pointed broom sedge	<i>Carex scoparia</i>	1-2'	will grow in water/wet soils	0.30
Owlfruit/stalk grain sedge	<i>Carex stipata</i>	1-2'	will grow in wet soils	0.20
Tussock Sedge	<i>Carex stricta</i>	2-3'	will grow in water/wet soils	0.30
Fox sedge	<i>Carex vulpinoidea</i>	1-3'	will grow in wet soils	0.20
Torrey's rush	<i>Juncus torreyi</i>		will grow in water/wet soils	0.10
Green bullrush	<i>Scirpus atrovirens</i>	5-8'	will grow in water/wet soils	0.40
Wool grass	<i>Scirpus cyperinus</i>	3-4'	will grow in water/wet soils	0.40
River bullrush	<i>Scirpus fluvialis</i>	4-6'	will grow in water/wet soils	0.20
Softstem bulrush	<i>Scirpus validus</i>	3-6'	will grow in water	0.20
Total Grass-like Plants Seeds				3.00

TOTAL GRASS AND GRASS-LIKE PLANTS SEED MIX FOR POND AREA

8.00

Common Name	Scientific Name	Height	Notes	% PLS by weight
Wildflowers*				
Swamp/Marsh milkweed	<i>Asclepias incarnata</i>	2.5-5'	wet soil, pink flowers, Jul-Aug	5%
Panicked aster	<i>Aster lanceolatus</i>	2-4'	wet soil, white flowers, Sept-Oct	5%
Red-stalked aster	<i>Aster puniceus</i>	3-5'	wet soil, blue/purple flowers, Sept-Oct	8%
Flat-topped aster	<i>Aster umbellatus</i>	4-5'	wet soil, white flowers, Aug-Oct	8%
Fireweed	<i>Epilobium angustifolium</i> ssp. <i>Angustifolium</i>	2-4'	dry-moist soils, pink flowers, July-Aug	2%
Joe-pye weed	<i>Eupatorium maculatum</i>	2.5-6'	wet soils, pink flowers, July-Aug	16%
Boneset	<i>Eupatorium perfoliatum</i>	3-5'	wet soils, white flowers, Sept-Oct	5%
Sneezeweed	<i>Helenium autumnale</i>	2-5'	wet soils, yellow flowers, July-Oct	2%
Giant sunflower	<i>Helianthus giganteus</i>	5-8'	wet soils, yellow flowers, Jul-Aug	2%
Common ox-eye	<i>Heliopsis helianthoides</i>	2-4'	moist to dry soils, yellow flowers, July-Sept	3%
Great blue lobelia	<i>Lobelia siphilitica</i>	1-1.5'	wet soils, purple flowers, Aug	1%
Monkey flower	<i>Mimulus ringens</i>	1-2'	wet soils/shallow water, purple flowers, Aug-Sept	1%
Mountain mint	<i>Pycnathemum virginianum</i>	2-4'	dry to wet soils, white flowers, Aug	1%
Black-eyed Susan	<i>Rudbeckia hirta</i>	1-3'	dry to wet soils, yellow flowers, Jul-Aug	5%
Canada goldenrod	<i>Solidago canadensis</i>	2-4'	wet soils, yellow flowers, July-Oct	3%
Tall mountain rue	<i>Thalictrum dasycarpum</i>	3-5'	wet soils, white flowers, Jun-Jul	5%
Blue vervain/Swamp verbena	<i>Verbena hastata</i>	2-4'	wet to moist soils, purple flowers, Jun-Sept	18%
Ironweed	<i>Vernonia fasciculata</i>	2-4'	wet soils, purple flowers, Jul-Aug	10%
TOTAL Wildflower Seed Mix				100%

Notes: *Overcast the grass and grass-like plant seed mix planting with a wildflower seed mix. If not this seed mix, then use one with at least 75% of these species and a similar number of other species suited for riparian and partially flooded habitats.

ATTACHMENT 3

AGENCY RECOMMENDED TREES AND SHRUBS FOR BERM PLANTINGS

Berm Planting Guidelines

Berms provide instant sight and sound protection. Vegetative barriers will take several years to become effective.

BERMS AS SIGHT AND SOUND BARRIERS

Construct soil or overburden berms with salvaged materials. Keep track of which berms are made out of what materials so that, when soil is needed for resoiling, the proper soil material will be selected for use. Permanent berms should be constructed of overburden or subsoil, covered with a layer of topsoil, and revegetated with a permanent seed mix.

Consider line of sight or sound when determining how high to make a berm. Along roadways, make berms at least 6' higher than the crown of the road. Leave berms with 2:1 or flatter sideslopes and seed them with the approved mix at the first appropriate opportunity.

VEGETATIVE SIGHT BARRIERS

Single-row tree and shrub plantings are useful as visual screens in areas where space is limited. To provide uniform density, alternate trees and shrubs within the row. Where tree spacing will be less than or equal to 10', alternate one shrub with each tree. Where tree spacing will be greater than 10', use additional shrubs at regular intervals, keeping each plant at least 3' apart. Always allow for a clear line of sight for safety.

Use multiple-row plantings where space allows.

VEGETATIVE SOUND BARRIERS

Tree and shrub plantings can significantly reduce noise if planted as follows: 1) locate the planting as close to the noise source as possible, 2) use tall, dense species for the main body of the planting, 3) use a dense shrub in the row closest to the noise source, 4) include at least one evergreen row for year-round noise reduction, 5) plant as many rows as available space will allow (three to five) without crowding, 6) if able, make the planting twice as long as the distance from the noise source to the point of protection, and 7) always allow for a clear line of sight for safety.

PLANT SPACING

Within rows, space shrubs 3 to 4' apart and trees approximately 80 percent of their mature crown width apart. Recommended plant spacings for the recommended windbreak species are included on the following table.

Between-row spacing must provide sufficient room for plant growth and any tillage equipment that will be used to maintain the planting. To determine this spacing, add the mature crown widths of plants in adjacent rows, divide by two, and add any space needed to accommodate cultivation. Between-row spacing typically ranges from 16 to 30'.

PLANT SPECIES

See the following table for recommended Montana windbreak species. Other site-adaptable species may also be used.

Common Name	Scientific Name	Spacing	20-year Height
*ASH, Green	<i>Fraxinus pennsylvanica</i>	10-14'	18'
*BUFFALOBERRY, Silver	<i>Shepherdia argentea</i>	3'	10'
*CHOKECHERRY	<i>Prunus virginiana</i>	8'	10'
*COTTONWOOD, Plains	<i>Populus deltoides</i>	10-14'	45'
*CURRANT, Golden	<i>Ribes aureum</i>	3'	6'
*DOGWOOD, Red-Twigged	<i>Cornus sericea</i> ssp. <i>Sericea</i>	3'	7'
*JUNIPER, Rocky Mountain	<i>Juniperus scopulorum</i>	6-8'	12'
*OAK, Bur	<i>Quercus macrocarpa</i>	20'	18'
*PINE, Limber	<i>Pinus flexilis</i>	8'	10'
*PINE, Ponderosa	<i>Pinus ponderosa</i>	10-14'	17'
*PLUM, American	<i>Prunus americana</i>	8'	10'
*ROSE, Woods	<i>Rosa woodsii</i>	3'	6'
*SERVICEBERRY	<i>Amelanchier alnifolia</i>	3'	10'
*SILVERBERRY	<i>Eleaegnus Commutata</i>	3'	6'
*SUMAC, Trilobe	<i>Rhus trilobata</i>	3'	8'
CARAGANA	<i>Caragana arborescens</i>	3'	10'
CHERRY, Nanking	<i>Prunus tomentosa</i>	3'	7'
HONEYSUCKLE, Blueleaf	<i>Lonicera korolkowii</i>	3'	8'
LILAC, Common	<i>Syringa vulgaris</i>	3'	6'
MAPLE, Amur	<i>Acer ginnala</i>	8-10'	15'
POPLAR, White	<i>Populus alba</i>	10-14'	25'
SANDCHERRY, Western	<i>Prunus, pumila</i>	3'	4'
SPRUCE, Colorado Blue	<i>Picea pungens</i>	10-14'	15'
WILLOW, Golden	<i>Salix alba</i>	10-14'	25'

* Montana Native Plant